

Claims

What is claimed is:

1. A lid molding system comprising:
an injection molding machine including:
an injection unit ; and
an injection molding machine clamp unit with an injection mold mounted therein; and
the injection mold including an in-mold lid handling system mounted thereto that includes at least one guide chute;

a lid conveyor positioned beneath the injection molding machine clamp unit to align and engage with the at least one guide chute when the injection mold is in a closed position;
the lid conveyor including means for lid guiding and means for lid driving;
wherein the lid conveyor is configured to receive lids from the guide chute of the in-mold lid handling system for conveying the lids in a substantially vertical orientation.
2. The lid molding system according to Claim 1, wherein the injection mold comprises a multi-level stack mold having a plurality of molding faces , each molding face including a plurality of rows of molding cavities thereon.
3. The lid molding system according to Claim 2, wherein the in-mold part handling system includes at least one side shuttle on each of the molding faces that is operable to translate laterally across the molding faces to transfer a plurality of lids from the rows of molding cavities to at least one guide chute.
4. The lid molding system according to Claim 3, wherein a guide chute is dedicated to each side shuttle .
5. The lid molding system according to Claim 4, wherein a side shuttle is dedicated to each row of molding cavities.

6. The lid molding system according to Claim 5, wherein a lid conveyor is dedicated to service all of the guide chutes of each molding face.
7. The lid molding system according to Claim 6, further comprising a gate positioned beneath an exit of the guide chute to provide a sequenced transfer of the lids to the lid conveyor .
8. The lid molding system according to Claim 5, wherein a guide chutes is dedicated to each side shuttle .
9. The lid molding system according to Claim 1, further including a lid packing station
10. The lid molding system according to Claim 9, wherein the lid packing station includes at least one lid stacker for stacking the lids.
11. The lid molding system according to Claim 10, wherein the lid packing station further includes a transfer robot and a bagger , the transfer robot transferring the stacked lids from the lid stacker to the bagger .
12. The lid molding system according to Claim 11, wherein the lid packing station further includes a conveyor for configured to convey the stacked and bagged lids ejected from the bagger .
13. A lid conveyor comprising:
a means for lid guiding configured to maintain a lid being guided therein in a non-rotating substantially vertical orientation; and
a means for lid driving that is configured to engage, in use, a peripheral portion of the lid , for transporting the lid therewith.
14. The lid conveyor according to Claim 13, wherein the means for lid driving comprises a re-circulating chain driven by a drive assembly.

15. The lid conveyor according to Claim 14, wherein the chain includes a plurality of chain links connected by linking pins.
16. The lid conveyor according to Claim 15, wherein each of the chain links comprises substantially parallel and spaced apart link members that are connected by a cylindrical spacer at an end thereof.
17. The lid conveyor according to Claim 16, wherein the peripheral portion of the lid engages the chain in the space provided between the cylindrical spacers between adjacent chain links .
18. The lid conveyor according to Claim 14, wherein the chain further includes a plurality of engagement members attached thereto for engaging the peripheral portion of the lid .
19. The lid conveyor according to Claim 13, wherein the means for lid driving comprises one of: i) a cable, or ii) a belt, arranged in an endless loop that is driven by a drive assembly, the one of: i) the cable, or ii) the belt including a plurality of lid engagement members thereon for engaging the peripheral portion of the lid.
20. The lid conveyor according to Claim 14, further including an elongate channel member configured to provide a base frame for the conveyor, the channel member including upper chain guiding surface and a lower chain guiding surface.
21. The lid conveyor according to Claim 20, further including a chain guide mounted to each side of the channel member, said chain guide extending above and below the upper and lower surfaces of the channel member , the chain guides being configured to provide, in conjunction with the upper and lower surfaces, a channel for guiding the chain along the conveyance path.
22. The lid conveyor according to Claim 21, wherein the a means for lid guiding comprises at least one upper guide arranged along each side of the lid conveyance path and connected to the channel member .

23. The lid conveyor according to Claim 22, wherein the a means for lid guiding further includes at least one lower guide arranged along both sides of the lid conveyance path and connected to the channel member .
24. The lid conveyor according to Claim 21, wherein the upper and lower guides are configured to be positionally-adjustable .
25. A method for lid molding including the steps of:
molding a plurality of lids in an injection molding machine;
opening the injection mold to reveal the lids ;
retrieving the lids from the injection mold using an in-mold lid handling system;
transferring the lids into at least one guide chute mounted to the injection mold,
using the in-mold lid handling system;
closing and clamping of the injection mold;
substantially simultaneously to molding a subsequent plurality of lids , releasing the
lids held in the at least one guide chute from the in-mold lid handling system
so that the lids drop therein under the force of gravity;
transferring the lids into at least one lid conveyors that are aligned with the at
least one guide chute beneath the at least drop chute, in the mold closed
position, in a substantially vertical orientation;
conveying the lids from the injection molding machine.
26. The method for lid molding according to Claim 25, further including the step of conveying the lids to a lid packing station .
27. The method for lid molding according to Claim 25, further including the step of conveying the lids to at least one lid stacker .